BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application:	Tolt, et al.
Serial No.:	08/859,960
Filed:	May 21, 1997
Art Unit:	1765
Examiner:	R. Kunemund
For:	PROCESS FOR GROWING A CARBON FILM

APPEAL BRIEF

Box AF
Assistant Commissioner for Patents
Washington, D. C. 20231

I. REAL PARTY-IN-INTEREST

The real party-in-interest is SI Diamond Technology, Inc. who is the assignee of the entire right and interest in the present Application.

CERTIFICATION UNDER 37 C.F.R. § 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to Box AF, Assistant Commissioner for Patents, Washington, D.C. 20231, on September 7, 1999.

Toni Asendorf
Signature

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Toni Asendorf
(Printed name of person certifying)

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Applicants, Applicants' legal representative, or assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-26 are pending in the Application. Claims 1-26 stand rejected.

IV. SUMMARY OF THE INVENTION

A process is utilized whereby a patterned cathode is produced without processing (e.g., etching) the emission film. (Page 3, lines 3-5.) This is accomplished by performing a treating step on the substrate prior to deposition, which may be comprised of a ceramic material such as fosterite. (Page 3, lines 5-7.) This treating step may be performed to etch a metal layer that has been previously deposited on the substrate in order to pattern the metal material, and then after the treating step, the film is deposited over the entire sample. (Page 3, lines 7-9.) The number of nucleation sites is greater at the locations where there is no metal resulting in preferential emissions of electrons at the sites. (Page 3, lines 9-11.) An advantage of the present invention is that the film grown on the treated portion of the substrate is a better electron emitting material than the film grown on the untreated portion of the substrate. (Page 4, lines 11-13.) The result of this advantage is that a pattern can be easily formed of the emission sites without having to perform any type of etching steps after the film as already been grown, or deposited. (Page 4, lines 13-15.) The cathode produced by the process of the present invention whereby an emitting film is deposited on a substrate can then be used as a field emitter device 80, which can then be utilized as a pixel within a display device, such as within display 938 described on pages 13-14 of the Specification with respect to FIGURE 9. (Page 10, lines 17-20.)

V. ISSUES

1. Are Claims 1-3, 10-12, 14-19 and 26 properly rejected under 35 U.S.C. § 103 as obvious over *Song et al.* (U.S. Patent No. 5,696,385)?

2. Are Claims 4-9, 13, and 20-25 properly rejected under 35 U.S.C. § 103 as being unpatentable over *Song et al.* in view of *Yoshioka et al.* (U.S. Patent No. 5,759,080)?

VI. GROUPING OF CLAIMS

Claims 1, 4, 14, 21, 23, 24, 25 and 26 may be considered as a group. Claims 1, 14, 17 and 26 may be considered as a group. Claim 9 is to be separately considered. Claims 12 and 18 may be considered as a group.

VII. ARGUMENT

1. Claims 1-3, 10-12, 14-19 and 26 are not properly rejected under 35 U.S.C. § 103 as obvious over *Song et al*.
2. Claims 4-9, 13, and 20-25 are not properly rejected under 35 U.S.C. § 103 as being unpatentable over *Song et al.* in view of *Yoshioka et al.*

Claims 1, 4, 14, 21, 23, 24, 25 and 26 all recite either that the substrate is treated to modify a morphology of the substrate, or change a chemical composition of the substrate, or roughen the surface of the substrate. In response, all the Examiner has stated is that *Song* performs the treating step when the metal layer 330 is patterned on substrate 310. The Examiner then states that since the structure is the same in *Song* as that recited in the claims, then the result is inherently the same. Applicants respectfully traverse this assertion by the Examiner. Though *Song* may perform an etching step to pattern metal layer 330 on substrate 310, nothing within *Song* teaches or suggests that such an etching step either (1) modifies a morphology, (2) changes the chemical composition of the surface of the substrate, or (3) roughens the surface of the substrate. It is entirely possible that the processes performed within *Song* do not modify any morphology, chemical composition, or surface of the substrate, while the processes performed within the present invention do. Since the Examiner has failed to specifically cite to any teaching or suggestion in *Song* that *Song*'s processes modify a morphology, chemical composition, or surface of the substrate, the Examiner has relied upon a statement that it would be inherent that the processes in *Song* affect the substrate 310 in such a manner. Applicants respectfully traverse such an inherency argument by the Examiner. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. See MPEP § 2112; citing *In re Rijckaert*, 9 F.3d 1531, 1534, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1993). In relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of

the applied prior art. MPEP § 2112; citing Ex parte Levy, 17 U.S.P.Q.2d, 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original).

Therefore, because of Applicants' traversal of the Examiner's assertion of what is inherently taught or suggested within *Song*, under MPEP § 2112, the Examiner is required to support the Examiner's assertions with objective evidence. Otherwise, the Examiner's *prima facie* case of obviousness in rejecting these claims fails, since *Song* does not teach the treating steps as specifically recited within these claims.

Claims 1, 14, 17, and 26 all recite that the carbon film is grown on the substrate. *Song* does not in any way teach or suggest that the emitter material 370 is grown on the substrate 310 as shown in Figures 10-15, or any of the other figures. In all embodiments taught or suggested within *Song*, a ballast material, such as material 365, is first deposited on the substrate before the emitter material 370 is deposited on the ballast material 365. The ballast material is not an emitter material, and is definitely not a carbon film, but is instead a resistive material such as doped amorphous silicon. Column 2, lines 26-27. Therefore, all of the steps referring to growing the carbon film on the substrate are not taught or suggested within *Song*.

As a result of the foregoing, Applicants respectfully assert that one skilled in the art at the time the invention was made would not have been able to recreate the claims noted above having the treating and growing steps. Furthermore, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. MPEP § 2143.03; citing *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). Quite clearly, there are two major steps within all of these claims that are not taught or suggested within *Song*, and therefore, the *prima facie* case of obviousness fails.

With respect to claim 9, the Examiner has not addressed this limitation in any way. For this reason alone, the Examiner has failed to prove a *prima facie* case of obviousness in rejecting claim 9. Claim 9 specifically recites the step of performing sonication on the substrate. Applicants have reviewed *Song* and *Yoshioka*, and neither of these references, either individually

or in combination, teaches or suggests such a sonication step. All that these references teach or suggest is the etching away of certain layers. However, the sonication step performed in the present invention does not perform such an etching process, and therefore one skilled in the art at the time the invention was made would not have equated etching steps with sonication steps.

Claims 12 and 18 specifically recite that the carbon film is also deposited on the metal layer. First, the Examiner has not specifically addressed these claim limitations, and therefore the Examiner has failed to prove a *prima facie* case of obviousness in rejecting claims 12 and 18. Second, *Song* does not teach or suggest depositing emitter material 370 on metal layer 330. Quite clearly, all of the teachings and drawings within *Song* show that a ballast material 365 lies between the emitter material 370 and the metal layer 330. Therefore, one skilled in the art at the time the invention was made would not have been able to recreate either of claims 12 or 18 in view of *Song*.

As a result of the foregoing, Applicants respectfully assert that all of claims 1-26 are patentable over the cited prior art.

Respectfully submitted,

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APPENDIX

1. A method for making a field emitter device comprising the steps of:
providing a substrate;
treating said substrate to modify a morphology of said substrate; and
growing a carbon film on said treated substrate.

2. The method as recited in claim 1, wherein only a portion of said substrate is subjected to said treating step, and wherein said carbon film grown on said treated substrate is a better field emitter than carbon film grown on an untreated portion of said substrate.

3. The method as recited in claim 2, wherein said carbon film grown on said treated portion of said substrate emits substantially more electrons when subjected to a specified electric field than said carbon film on said untreated substrate.

4. The method as recited in claim 1, wherein said substrate is treated with a base, wherein said treating step changes the chemical composition of said surface of said substrate.

5. The method as recited in claim 1, wherein said substrate is treated with an acid.

6. The method as recited in claim 5, wherein said substrate is a ceramic.

7. The method as recited in claim 5, wherein said substrate is a metal.

8. The method as recited in claim 5, wherein said substrate is a glass.

9. The method as recited in claim 1, further comprising the step of performing sonication on said substrate.

10. The method as recited in claim 3, wherein said substrate was not subjected to a sonication step.

11. The method as recited in claim 1, further comprising the steps of:

depositing a metal layer on said substrate whereby said metal layer has a predefined pattern so that a portion of said substrate is accessible through said metal layer, wherein said depositing step is performed before said growing step.

12. The method as recited in claim 11, wherein said step of growing said carbon film also deposits said carbon film on said metal layer, wherein said carbon film is a continuous film.

13. The method as recited in claim 11, wherein said step of depositing said metal layer on said substrate further comprises the steps of:

depositing said metal layer on said substrate;

patterning said metal layer using photolithography; and

etching said metal layer producing said predefined pattern.

14. A field emitter device manufactured by the following steps:

providing a substrate;

treating said substrate to modify a morphology of said substrate; and

growing a carbon film on said treated substrate, wherein only a portion of said substrate is subjected to said treating step, and wherein said carbon film grown on said treated substrate is a better field emitter than carbon film grown on an untreated portion of said substrate, wherein said carbon film grown on said treated portion of said substrate emits substantially more electrons when subjected to a specified electric field than said carbon film on said untreated substrate.

15. The device as recited in claim 14, wherein said substrate is treated with an acid.

16. The device as recited in claim 15, wherein said substrate is a ceramic.

17. A method for depositing a carbon film comprising the steps of:

depositing a metal layer on a substrate whereby said metal layer has a predefined pattern so that a portion of said substrate is accessible through said metal layer; and

depositing said carbon film on said portion of said substrate.

18. The method as recited in claim 17, wherein said step of depositing said carbon film also deposits said carbon film on said metal layer.

19. The method as recited in claim 18, wherein said carbon film is a continuous film.

20. The method as recited in claim 17, wherein said step of depositing said metal layer on said substrate further comprises the steps of:

depositing said metal layer on said substrate;

patterning said metal layer using photolithography; and

etching said metal layer producing said predefined pattern.

21. The method as recited in claim 20, wherein said etching step roughens a surface of said substrate at said portion of said substrate.

22. The method as recited in claim 21, wherein said substrate is a ceramic-like material.

23. The method as recited in claim 17, wherein said step of depositing said metal layer on said substrate further comprises the steps of:

etching said substrate, wherein said etching step changes the chemical composition of said surface of said portion of said substrate; and

depositing said metal layer on said substrate through a mask producing said predefined pattern.

24. The method as recited in claim 23, wherein said etching step roughens a surface of said substrate.

25. The method as recited in claim 20, wherein said etching step changes the chemical composition of said surface of said portion of said substrate.

26. A method for making a field emitter device comprising the steps of:

providing a substrate;

treating said substrate to modify (1) a morphology of said substrate, and/or (2) a chemical composition of said substrate; and

growing a carbon film on said treated substrate, wherein only a portion of said substrate is subjected to said treating step, and wherein said carbon film grown on said treated substrate is a better field emitter than carbon film grown on an untreated portion of said substrate, wherein said carbon film grown on said treated portion of said substrate emits substantially more electrons when subjected to a specified electric field than said carbon film on said untreated substrate.